

WHAT IS CLAIMED IS:

1. A system for vectoring a primary flow by varying an effective throat or sonic plane within the primary flow, comprising:

5 an opening for accepting the primary flow;

at least one primary injector located wherein said at least one injector is inclined to oppose the primary flow;

10 at least one supplemental injector wherein said at least one supplemental injector is located downstream of the at least one primary injector, wherein said at least one supplemental injector is inclined to oppose the primary flow, and wherein the at least one primary and supplemental injectors provide a flow field opposed to a subsonic portion of the primary flow in order to vector the primary flow; and

15 at least one controller operable to direct said at least one primary and supplemental injector to provide a flow operable to vary the effective throat.

20 2. The system of Claim 1, wherein said at least one controller is operable to vector the primary flow along an intended vector.

25 3. The system of Claim 2, wherein said intended vector is contained within an intended vector plane.

30 4. The system of Claim 3, wherein said at least one primary and supplemental injectors provide a flow field opposed to the primary flow in said intended

vectoring plane, parallel to said intended vectoring plane in a longitudinal plane, and that is parallel to the primary flow axis in a third plane orthogonal to said intended vector.

5

5. The system of Claim 1, wherein a location, size, and/or orientation of said effective throat are varied.

10

6. The system of Claim 1, further comprising:  
at least one mechanical actuator coupled to said at least one controller, wherein said at least one controller directs said at least one mechanical actuator to provide at least one fluidic pulse to said at least one primary and supplemental injector.

15

7. The system of Claim 6, wherein said at least one mechanical actuator comprises a mechanical valve.

20

8. The system of Claim 6, wherein the at least one mechanical actuator comprises an acoustic vibrator.

25

9. The system of Claim 6, wherein said at least one primary and supplemental injector rotates relative to said throat of the nozzle.

10. The system of Claim 1, wherein said controller further comprises:

A

a processor operable to execute software instructions to control the effective throat of the primary flow over a range of operating conditions.

5           11. The system of Claim 1, wherein a fluidic pulse from said at least one supplemental injector is operable to skew a boundary of the sonic plane of the primary flow towards said at least one supplemental injector.

10           12. The system of Claim 1, wherein the primary flow has a temperature and wherein said pulsed secondary flow throttles the primary flow by decreasing the effective cross sectional area of the effective throat to control said temperature of the primary flow.

15           13. The system of Claim 1, wherein the primary flow has a pressure and wherein said flow throttles the primary flow by decreasing the effective cross sectional area of the effective throat to control said pressure of the primary flow.

20           14. The system of Claim 1, wherein the primary flow has a massflow and wherein said flow throttles the primary flow by decreasing the effective cross sectional area of the throat to control said massflow of the primary flow.

25           15. The system of Claim 1, wherein said at least one primary and supplemental injector provides a

A

symmetric flow field in order to vector the primary flow.

5 16. The system of Claim 1, wherein said at least one injector provides an asymmetric flow field in order to vector a primary flow exhaust.

10 17. The system of Claim 1, wherein said at least one controller directs said at least one primary and supplemental injector to simultaneously throttle and vector the primary fluidic flow.

15 18. The system of Claim 1, wherein the primary flow is contained within a fixed geometry nozzle.

19. The system of Claim 1, wherein the primary flow is contained within a variable geometry nozzle.

20 20. The system of Claim 1, wherein the primary flow is contained within a nozzle integral to a jet engine onboard an aircraft.

25 21. The system of Claim 1, wherein said pulsed secondary flow comprises fuel injected by said at least one primary and supplemented injector.

22. The system of Claim 21, wherein said injected fuel serves as an after burner.

A

23. The system of Claim 1, wherein said at least one primary and supplemental injector injects a sonic pulsed secondary flow.

5           24. The system of Claim 1, wherein said at least one primary and supplemental injector injects a subsonic pulsed secondary flow.

10           25. The system of Claim 1, wherein said at least one primary and supplemental injector injects a supersonic pulsed secondary flow.

26. A method for controlling a primary flow by varying an effective throat, comprising the steps of:  
15           directing a primary flow through a structure wherein the primary flow has a subsonic region prior to the effective throat; and  
              directing a pulsed secondary flow opposed to the primary flow to vary an effective size, location, and  
20           orientation of the effective throat, wherein said pulsed secondary flow is injected to oppose the primary flow from at least one primary injector and at least one supplemental injector location downstream of said at least one primary injector.

25           27. The method of Claim 26, wherein said structure is a nozzle.

30           28. The method of Claim 27, wherein said nozzle is selected from the group of nozzles consisting of

A

high aspect ratio biconvex aperture nozzle and ultra  
high aspect ratio trapezoid aperture nozzle.

5           29. The method of Claim 28, wherein said at least  
one primary injector and at least one supplemental  
injector are slot type injectors, wherein said at least  
one primary and supplemental injectors provide a  
secondary flow field opposed to the primary flow in an  
intended vectoring plane, parallel to said intended  
10       vectoring plane in a longitudinal plane, and parallel  
to an axis of the primary flow axis in a third plane  
orthogonal to an intended vector of the primary flow.

15           30. The method of Claim 28, wherein said at least  
one primary injector and at least one supplemental  
injector are arrays of injectors, wherein said at least  
one primary and supplemental injectors provide a  
secondary flow field opposed to the primary flow in an  
intended vectoring plane, parallel to said intended  
20       vectoring plane in a longitudinal plane, and parallel  
to an axis of the primary flow axis in a third plane  
orthogonal to an intended vector of the primary flow.

Dns A' 7

A

~~Attorney~~